QK
541.5
.N7
B75

NATURE STUDY LEAFLETS

ISSUED BY THE

NATURAL SCIENCE COMMITTEE OF THE ASSOCIATE ALUMNÆ
OF THE NORMAL COLLEGE, NEW YORK CITY

NUMBER FOUR FEBRUARY, 1900

MOSSES.

BY ELIZABETH G. BRITTON.*

NEW YORK BOTANICAL GARDENS, BRONX PARK.

In a popular sense, the above name is very much misused, and most people, even those who have some knowledge of Botany, are apt to mistake several different kinds of plants for the true mosses.

The tallest and most conspicuous of these are the *Lycopodiums* or Club-Mosses, also known as Ground-Pines or Christmas greens, whose ancestors grew to be trees in the old coal-forming ages of the world, and which are now used for wreaths and garlands at Christmas-time. Closely related to these are the *Selaginellas* of the green-houses and the little wild *Selaginella apus* of our fields and woods, specimens of which are often sent to me to name as mosses. These both belong nearer the ferns and are known as Fern allies.

The Seaweeds also are frequently called sea-mosses; and this is the title of a popular book on the Algae, including all the plants which grow in salt water along our sea coasts. One of these is the Irish moss, which is used as a remedy for colds and as an ingredient for puddings.

The Lichens are also often spoken of as mosses, and it is probable that Longfellow referred to one of them, *Usnea barbata*, which hangs from the trees in northern regions, when he wrote of "The murmuring pines and the hemlocks, bearded with moss." The "Reindeer moss" is also a lichen belonging to the genus *Cladonia*, its specific name *rangiferina* being given to it in reference to its being the food of the reindeer. The following verses will serve to indicate some of the prettiest and commonest of the lichens which may be found in this vicinity, for even the Reindeer lichen grows in this region.

* Copyrighted, 1900, by E. G. BRITTON.

"But in quaintness of structure, the lichens outvie
All else that in nature rejoices the eye.—
All sober in color, but varied in form,
From the *Graphis*, whose tracings the tree-trunks adorn,
As with Arabic writing, or outlines of maps,
To the ugly rock-tripe that on yonder cliff flaps.
From old branches the pendent gray *Usnea* sways,
While upon them the graceful *Parmelia* displays
Its parterres with curved paths, which the pixies might tread,
And gay little seed-beds, brown, orange, and red.
And here, on this knoll, which the wind has swept clean,
The *Cladonia's* whimsical structures are seen.
One resembles a balconied minaret tall,
Or a ruined old castle, just ready to fall;
And another seems most, with its flame-colored tip,
Like a beacon-fire such as the old Normans lit.
And those that like delicate corals appear
Are the favorite food of the arctic reindeer."

But even after the name is restricted to its scientific sense, the mosses include two tribes of closely allied plants, the true mosses and the liverworts, or scale-mosses. Few students of botany even, know any of the liverworts by name or by sight, though descriptions and illustrations of them may be found in two editions of Gray's Manual, and they grow commonly in this vicinity in similar localities to those where the true mosses grow. Such, for instance, is the showy *Marchantia*, which has been found in grassy, shady places in old gardens, and under bushes along streams in several places in the boroughs of the Bronx and Richmond, and thrives in my garden in Bedford Park.

Even in the borough of Manhattan, it is not unusual to those who know them, to see mosses growing in the crevices of the city pavements, at the base of old walls, and in the cracks where the mortar is crumbling. The stair-cases of Morningside Park, yielded several species last spring, and the rocks in West 110th street, five or six others, beside a species of fern. In Bronx Park over seventy species have been collected and listed for the Herbarium of the Museum, and it is probable that a like number could be found in Van Courtland and Pelham Parks, or in Prospect Park, if they were as carefully searched and the permission could be obtained to do so. In the Borough of Richmond, there is even a still greater variety, and on the Palisades above Fort Lee one of the largest local collections ever made in this region was gathered by C. F. Austin, and is now in the possession of the Herbarium of Columbia University.

LIBRARY
THE NEW YORK BOTANICAL GARDEN
BRONX, NEW YORK 10458

It requires much time and study to know the mosses well and be able to distinguish the different species and varieties, but it is easy to learn the names and to be able to recognize about fifty species which are common within the present city limits, without the aid of the microscope or even without a hand lens, though this assistance will add greatly to the surety and exactness of the recognition.

In trying to make the acquaintance of the mosses, as in any other study, care and attention to detail is necessary. It is best to carry either a note-book or some papers along for wrapping the specimens as they are found, and at the time they are gathered note the habit of growth, whether on trees, rocks, or on the ground, whether in wet or dry places, and to notice their color; also if they are erect, or creeping, climbing up trees, or hanging down from rocks, or even floating in the water. Note also whether they are in fruit or sterile, and keep a record with each specimen of the place where it grew and the time when it was gathered. It is well also to record whether the season be early or late, wet or dry, as the weather has much to do with the development of these plants.

Mosses have stems and leaves, and they also have organs of reproduction, which correspond to the anthers and pistils of higher plants, known as the antheridia and archegonia. The antheridia contain the motile antherozoids, the fertilizing protoplasmic bodies which make their way down the neck of the archegonium to the egg-cell, which lies in the same position relatively, that the ovules occupy in the ovary of flowering plants. As soon as this takes place, and it usually happens in summer or fall, during a wet, rainy season, growth begins in the egg-cells, they divide and expand, the walls increase in circumference, and finally are torn away at the base being carried upward on the lengthening pedicel, to become the cap or protecting calyptra, which remains on while the capsule or spore-case is maturing its spores. It frequently remains on all winter and falls off in the spring-time when the spores are ripe. As soon as they are ripe, the lid also falls away, and the fringe of teeth surrounding the mouth spread out, forming one of the loveliest objects under the microscope, or even to be readily seen with a hand lens. The only comparison that is adequate is the fringe of tentacles around the mouth of a sea-anemone; lovely, bright, spreading, stars of red, orange and yellow, numbering always some multiple of four.

"What tree or what herb, be it ever so fair,
Can in exquisite grace with the mosses compare?
The feathery Hypnums rich tapestries spread,
And many-hued mats, soft as down to the tread.
Wide o'er cold bogs spreads the pallid peat moss;
Fontinalis' green tresses the mountain-streams toss;
The emerald Bryum on moist shady banks
Unfolds its rosettes, and here, too, in close ranks,
The troops of Dicranum are tilting their lances,
And the Liliput fruit of Bartramia dances
In each passing breeze; all these tiny green spheres
Are caskets of moss-seed, mere dust it appears,
But all vital with life, but as yet it is hid
By a cunningly fitted, and bossed little lid;
While above this a veil, too transparent to hide,
Rests lightly, as over the head of a bride."—*A. H. Curtiss.*

"The feathery *Hypnums*" cover the tops of the rocks in the hemlock grove in Bronx Park, and grow on many an old stump and log in the woods, where we love to wander when spring-flowers tempt us out on long walks. Many of them are like worsted or chenille, their leaves are so small and lie so close along the stem. Others are like miniature evergreens and resemble most the tall spires of the balsams and spruces as they tower above the forests of the Catskills and Adirondack mountains. One is known as *Thuidium*, the Little Cedar, and the name *Hypnum* is derived from the same root word as *Hypnotism*, meaning sleep.

The pallid peat-moss is not common in this region, because we have very few "cold bogs." But three species are found occasionally in wet ditches and swamps where the alders grow, *Sphagnum acutifolium*, the sharp-leaved peat-moss, *Sphagnum squarrosum*, the spreading-leaved peat-moss, and *Sphagnum cymbifolium*, the boat-leaved peat-moss. Specimens for the class-room may be had from the florists, who use them for packing, or even from the dealers in hay and feed, who sell what they call "peet moss," a sign familiar at one of the stations to all who travel on the line of the Harlem Railroad. It is used for bedding in stables on account of its ability to absorb many time its weight in water, a property due to the fact that its cells are full of holes or pores like a sponge, and the water replaces the air they contain very rapidly.

We have not yet come to using peat for fuel, as the peasants do in Ireland and other parts of Europe, but if settlers in virgin forests continue to burn standing forests, as they clear the ground, and the wanton destruction of our woods goes on unchecked, we shall soon be using it or some other substitute,

and the Government will be forced to plant trees in plantations as has been done in Germany and France. No better use can be made of Arbor Day, in the schools, than to instill the love of trees in the children, and the desire to preserve what few forest areas remain, within our state, intact.

"*Fontinalis*' green tresses, the mountain streams toss." We do not need to go to the mountains to find *Fontinalis*. The teachers in the High School can guide you to where you will find it in the vicinity of the city, not many miles away from Woodlawn, the city of the dead. Its long, dark-green, tresses float in the cold waters of "Dog Brook" and many of them are over a foot long. Its leaves are in three ranks, and boat-shaped, or shell-shaped, and they have no vein. It rarely fruits, however, in this region, and I have only once found it fruiting in the mountains of northern New Jersey. It also is common in streams on the Palisades.

"The emerald *Bryum* on moist shady banks unfolds its rosettes." Yes, but there are ruby Bryums, silvery Bryums, and golden Bryums. *Bryum argenteum*, the silvery Bryum, is the commonest of them all, and I have seen it many a time in the crevices of the side-walk on Fourth Avenue, near Fiftieth Street, along the side of the walk from the Railroad in Bedford Park, in the copings and stair-cases of Morningside Park, and have had it sent to me from the summits of the Andes, and from a door-mat in the classical town of Cambridge, Massachusetts. The tips of its leaves are without chlorophyll and end in a fine bristle, and the whole plant derives its grey-green, silvery tint from these characters. Its fruit is a jewel-box of the loveliest description, all frosted and resplendent, with red, orange, and gold, and the fringe of teeth around its mouth is a very beautiful and complicated object under the microscope. Specimens may be found in fruit in waste, sandy places, and newly turned earth along the Mosholu Parkway, and duplicates will be sent in quantity for the next distribution by the New York Botanical Gardens, or may be had from me by sending a self-addressed and stamped envelope.

The pedicels of many of the Bryums are a bright, glossy red, and the leaves in many of them, especially at the base and along the vein, are also red. There are about twenty-five species of the genus in the Eastern states, but only about five are common in the vicinity of New York.

"The troops of *Dicranums* are tilting their lances." Those lances are the capsules with their long-beaked lids and sharp-

pointed caps or calyptras, which are tilted on one side and all point in one direction. As the *Dicranums* are all gregarious and grow in colonies or cushions, on the ground or on old decaying logs, and even on rocks, they make showy, dark-green or glossy yellow-green mats. They are often gathered to fill in the windows of fish stores and florists, and may be seen in many of the better shops of Manhattan. *Dicranum scoparium*, the "Broom-Moss," not only tilts all its capsules one way, but also bends its leaves all in one direction like the bristles of a hair-broom, whence its specific name, *scoparium*. It grows on the ground in Bronx Park, in wet woods, and also in various other places in the Borough of the Bronx. *Dicranum fulvum* covers with dark-green, velvety sheets the rocks in the Hemlock Grove, but never has been known to fruit there, and *D. montanum* has also been found there, but is rare. *Dicranum flagellare*, so-named because the young branches start out like bundles of whips, grows on old, decaying logs in swampy woods, and is wonderfully glossy and dark-green in color. About six species in all are known to grow in the limits of the city. *Dicranella heteromalla*, a first cousin to the *Dicranums*, is abundant at the base of trees on lawns, along roadsides and in woods, and, as its name implies, is a diminutive image of the Fork-Mosses. This name is given them because the teeth which surround the mouth of the capsule are all bifid or forked. Another relative of the *Dicranums* is the White-Moss, *Leucobryum glaucum*, a tautological name, emphasizing its pale-green color. Its leaves, like those of the Peat-Mosses, are composed of cells having very large air spaces, and little chlorophyll or leaf-green, so that the whole moss is light in color. It grows in similar places in woods, often with the Broom-Moss, and occasionally forms large domes, like bee-hives, at the base of trees in swamps. It is white only when dry. If saturated with moisture, as it often is in winter, the color is a pale-green.

Bartramia, the Apple-Moss, was named for John Bartram, of Philadelphia, who corresponded with Linnæus, and had one of the earliest botanical gardens in this country. His old home and garden, now within the limits of the City of Philadelphia, has been preserved as a public park. *Bartramia pomiformis*, is not a common moss in this region, though it does grow in a few places in Bronx Park. It loves shady rocks and rich leaf-mould, and its bright green curly leaves are a pretty setting for the round brown capsules, which suggest an apple in shape.

The Hair-cap Mosses, *Polytrichum* and *Pogonatum*, are the tallest of the mosses and they have the most highly developed, woody stems. *Polytrichum commune*, whose hairy caps always remind me of the one Robinson Crusoe made of goat-skin, and *Polytrichum Ohioense*, are common in Bronx Park, and also in old fields and grassy meadows elsewhere. Beneath the hairy cap, the lid suggests a "tam-o-shanter," and still better to protect the spores, there is a tightly fitted drum-head, dove-tailed on to the tips of the teeth. Its leaves, too, are specially fitted for protection against dryness and freezing, as they roll in their edges, making a tubular cavity, as the *Rhododendrons* do with their leaves in winter and in drought. On freshly broken soil along roadsides, the Goats-beard Moss grows, *Pogonatum tenue;* it, too, has a hairy cap, and is first cousin to the *Polytrichums*, having a similar protection for its spores. It always forms a bright-green felt of protonema, or fine green threads, covering the ground with a delicate billiard-cloth, until the plants are ready to grow. In this way it holds the crumbling earthy banks together, and comes off in sheets when gathered. To this family also, though wearing a plainer cap, with a few short hairs, belongs the moss dedicated to the Empress Catharine of Russia, *Catharinea angustata*, which is also found commonly fruiting in winter at the base of trees, in open places along roadsides and in woods. On old stone walls, the bright-red rosettes of its antheridial heads, may be found even in winter-time, and I have gathered them on the rocks of 110th Street and Amsterdam Avenue. This moss also protects its leaves from drying and frost, by curling them up, and has gills on the upper side of the leaf along the vein, as do the Hair-cap Mosses. But the capsules are perfectly smooth and cylindric, instead of being angled, or cubical as in *Polytrichum commune.*

All over the rocks, where the water has settled and staid during the winter, there will be seen in February and March very brilliant, bright-green cushions of the "Horn-toothed Moss," *Ceratodon purpureus.* Its pedicels as they grow upward are a bright wine-red, and very numerous, and each becomes tipped by a ribbed and bent capsule, which is also purple. Around its mouth, may be seen with a lens, the curiously divided teeth, thickened at the joints and resembling so much the horns of an Antelope or Chamois, that they have given the name of "horned-toothed" to the genus. This moss was abundant last winter in vacant lots opposite St. Luke's

Hospital, and may be found on every rock-ledge, growing with the hoary-leaved *Hedwigia albicans*, in Bronx Park.

In the crumbling mortar of old walls and foundations, on the corner of Lexington Avenue and Fiftieth Street, on various ruins and deserted houses in the Borough of the Bronx, the Cord-Moss, *Funaria hygrometrica*, may be found, readily known by the way the pedicels of the capsules twist around each other when dry, so that it is impossible to separate them without decapitating them. The French call it "La Charbonniere," in reference to its well-known preference for growing on charred wood, and it might also well be called Cinderella, for it loves ashes. The Top-Moss is its first cousin, and be found in the spring-time, with numerous top-shaped capsules, in old flower-beds and along ditches, and in wet fields. Its name is *Physcomitrium turbinatum*, in reference to the shape of its capsules.

It is not unusual to find also on old walls and in crumbling mortar, the Wall-Moss, *Tortula muralis*, and even on the ground, where old houses have stood, it grows abundantly in Bronx Park. It leaves are a very bright-green, and rough with fine papillae, like the surface of the tongue, and each tipped with a long, slender bristle. Its teeth are curiously twisted, hence its generic name, *Tortula*, and it belongs to the same family as the Red-bearded Mosses, the *Barbulas*, some of which also grow in waste places and on old walls. It is also found associated with the bright-green cushions of the tiny *Weisia viridula*, the green moss; its leaves are such a bright, joyful green. They all fruit in winter or very early spring, and fruit abundantly, so that the capsules stand up all over the tufts, like bristling porcupine quills.

The "Brownies" of the moss world are everywhere, but few people know them or see them. In my own garden, under the shade of the grasses on the lawn, they fruited last fall; and in all the muddy, grassy fields around the museum in Bronx Park, they may be found. Under the alders in the bog-garden, the smallest of them all and the shortest-lived one, *Ephemerum spinulosum*, was found, full of tiny globose, orange capsules. In fact, nature has compensated them for their small size and ephemeral lives by giving them a sure means of reproduction, large, horny, warty spores, almost the largest known in any of the mosses. To that class belong the *Pleuridiums*, the *Astomums*, the *Bruchias*, and the *Nanomitriums*, one of which enjoys the honor of only having been found once by C. F. Austin, who deserved to be called "sharp-eyed."

New York Botanical Garden Library
3 5185 00232 7953

The whole plant is not as large as the smallest letters used in printing, and he must have crawled on his hands and knees to see it! They all grow on the ground in damp places, and live through the winter till the muddy fields dry up. There are about twenty different kinds of Moss-Brownies and each is as different from the other, and as much an entity in miniature, as Palmer Cox ever evolved from his fertile brain and pen.

Closely related to the *Bryums*, but with larger leaves and often bearing long, creeping runners, on which the leaves are two-ranked, are the *Mniums*, filling in the crevices among the roots of grass, under the shade of trees on lawns and roadside banks, leaning over the side of the river and growing around the roots of trees in wet woods. *Mnium cuspidatum*, may be found fruiting in April or May, and is one of the prettiest as well as the commonest of the genus, having been collected in almost every State and Territory in the United States. *Mnium hornum* and *Mnium punctatum* also grow in Bronx Park, but none of them have any common names, though one might readily be coined for them, the Starry Mosses, because they have been called *Astrophyllum*, in reference to the rosettes of leaves which surround the clusters of reproductive organs. These are quite conspicuous in some of the species, giving a dark eye to the rosette, like the Composites. Fifteen species occur in the Eastern States, five having entire leaves, five with single teeth on the edges of the leaves, and five with the teeth double or in pairs.

Another one of the Split-toothed Mosses is *Fissidens*. Three species grow in Bronx Park, fruiting in fall and winter, *Fissidens minutulus*, the small split-toothed moss, *F. adiantoides*, the maiden-hair split-toothed moss, and *F. taxifolius*, the yew-leaved split-toothed moss. All have their leaves in two flat rows, overlapping each other closely, and all fruit abundantly in wet woods and on stones along ditches and streams. They also have a lovely red, starry fringe around the mouth of the capsule, like the sea-anemones.

There are a large number of creeping, side-fruited mosses allied to the *Hypnums* which are are too difficult for the beginner to recognize. The commonest are the *Anomodons*, *Thelias*, *Entodons* and *Leskeas*, but the Little-ladder Moss, *Climacium Americanum*, anyone can know, as its tree-like stems may be seen in wet woods and swamps, on rocks along streams, and it fruits in the Boroughs of Richmond and the Bronx in the fall, and the capsules stay on all winter. Its teeth are like little ladders.